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ABSTRACT

This qualitative study investigated the temporal identities of 4- and 5-year-old children in Mexico and the United States, and the conditions that shaped changes in their ideas about time after they entered public school kindergarten. The study also examined the children's families, communities, and classrooms to gain a comprehensive view of the culture of time in each setting. A literature review was used to draw conclusions about common themes of time, which formed the conceptual framework for the study. The framework encompassed these five areas: (1) temporal structures; (2) timekeepers; (3) emotional bonds to time; (4) temporal language; and (5) nonrhythmic cues. A maximum variation sample (Patton, 1990) was used to capture central themes across diverse cultural, socioeconomic, and geographic areas. Twelve kindergarten children constituted the case studies; six from North Carolina and six from the state of Campeche, Mexico. Three phases of data were collected through semi-structured interviews and activities, observational field notes, and a review of documents related to state policies and standards. Results showed the children entered school with a complex network of temporal constructs. During the kindergarten year these were challenged by encounters with more formal approaches to time that emphasized structured daily schedules and conventional timekeeping. As the children developed new ways to organize, use, and understand time, the boundaries and content of their temporal identities changed. Contextual factors across sociocultural systems played a vital role in this process. Findings suggest that formal schooling should take into account the informal knowledge that children develop in home, community, and sociocultural systems regarding the construction of time concepts. Contains 5 tables and 12 references. (BT)

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Under Construction! Temporal Identities of Kindergarten Children in Mexico and the United States

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Introduction

Among the collection of characteristics comprising individual identity is temporal placement. By locating oneself physically and psychologically within the many layers of sociocultural context encountered each day, individuals construct interwoven clusters of temporal information. We refer to the composite of these clusters as one's temporal identity. Children enter public schools with temporal identities largely based on home and community experiences. These constructs are challenged in new ways by the institutional environment of public schooling. For example, children learn time divisions for the day according to new activities (e.g., work time, center time, recess) and rhythmic biological processes such as eating, sleeping, and toiletry needs become entrained by superimposed schedules. The complexities of temporal adjustments for kindergarten children are more often than not ignored, though clock time governs how families organize their lives, curriculum and instructional practices, school scheduling policies, and the opportunities children have to explore, comprehend, and master learning. The purpose of this qualitative study was to investigate the temporal identities of four- and five-year-old children in Mexico and the United States, and the conditions that shaped changes in their ideas about time after they entered public school kindergarten. Additionally, we examined the family, community, and classroom systems of the children to gain a comprehensive view of the culture of time in each setting.

A review of time literature in anthropology, the natural sciences, developmental psychology, and education was used to draw conclusions about common themes of time, which formed the conceptual framework for this study. The conceptual framework encompassed the following five areas: (a) temporal structures (awareness of time-related rhythmic events),

(b) timekeepers (methods of marking and measuring time); (c) emotional bonds to time (time-related emotional responses); (d) temporal language (expressions showing an awareness that time is related to objects, activities, people); and (d) nonrhythmic cues (nonrhythmic contextual factors).

Theoretical Framework

As humans we cannot conceive of time without framing it in some type of system. There are time systems related to physical environment such as calendars, systems connected to life cycles, and time-related explanation systems such as history. Systems thinking is a method of analysis used to gain a comprehensive picture of the complexities of the world (Capra, 1996). Patton (1990) supports the use of a systems theory approach to qualitative research in education, especially when conducting international studies to gain a holistic understanding of human behavior. Bronfenbrenner's (1979) theoretical framework is a systems approach based on the interactions, activities, and roles (called proximal processes) that engage the developing person and cause lasting changes in his or her behavior. According to Bronfenbrenner, these experiences occur in an environment composed of four nested structures: the microsystem, the mesosystem, the exosystem, and the macrosystem. Together, the principles of systems thinking, Bronfenbrenner's theory of human development, and Vygotsky's theories concerning the role of sociocultural context in cognitive development comprise the theoretical framework used in this research.

Methodology/Research Design

A maximum variation sample (Patton, 1990) was used to capture central themes across diverse cultural, socioeconomic, and geographical areas. Twelve four- and five-year-old children

who entered public school kindergarten in the fall of 1999 constitute the case studies. These children had no prior institutional experience such as preschool or day care and were typical in their development as reported by their parents. Six children (three males and three females) were selected in Orange and Chatham counties in North Carolina, United States, and six others (two males and four females) in Pich and Campeche (the city) in the state of Campeche, Mexico. Socioeconomic and geographical differences ranged from families living in one room houses with no electricity in a rural Mexican community of 1500 people to urbanites with modern conveniences. Variations in cultural heritage of the children included: African American, Caucasian, Spanish, and Maya. Eleven children completed the study as one child in North Carolina moved away. Additional information obtained from the mothers, teachers, and education administrators helped ensure a system perspective for each case study.

Over the course of one year, beginning in the summer of 1999 and ending in the summer of 2000, three phases of data were collected through: (a) semi-structured interviews with children, parents, teachers, and education administrators; (b) semi-structured activities with children including drawings of time-related objects and concepts and verbal descriptions of time-related photographic images from the home and classroom; (c) observational field notes of the homes, communities, schools, and physical surroundings with a special emphasis on time indicators; (d) classroom observations (two observations per classroom); and (e) a review of documents related to state policies, demographics, and federal and state standards affecting time-related school activities. All verbal and written information was presented in the person's native language (Spanish or English).

The focus of the analysis was a characterization of thematic categories and their

interconnections within and across each of the five conceptual areas. For that purpose, all tape-recorded interviews were transcribed, translated into English, and compared with field notes for accuracy. Transcripts, field notes, classroom observations, and other written documentation were classified, coded, and organized according to relationships to identify links for each child's case study as well as across the entire data set. To facilitate this analysis, NVIVO was used. In addition, tables of categorized notes, frequency counts, and quotations were developed for each chapter of the results to facilitate the data analysis. Approximately 15 percent of the data collected was read and coded by two independent parties as a measure of interrater reliability. The interrater reliability resulted in 85 percent agreement between the principal investigator and one independent rater, and 86 percent with the other independent rater.

Results

The results show that the children entered school with a complex network of temporal constructs. During the kindergarten year, existing temporal constructs were challenged by encounters with more formal approaches to time that emphasized structured daily schedules and conventional timekeeping. As the children developed new ways to organize, use, and understand time, the boundaries and content of their temporal identities changed. Contextual factors across sociocultural systems played a vital role in this process.

Temporal Structures

Internalization of a number of concepts contributes to the development of temporal structures, particularly the ability to: (a) discriminate temporal characteristics (e.g., synchrony, duration, rhythm, pace); (b) associate a variety of events according to their temporal relationships (e.g., before/after, event sequencing); and (c) identify and anticipate events according to their

temporal regularity (e.g., cycles) (Lewkowicz, 1992). Changes in the children's constructs for each of these areas emerged from the data as described below.

Temporal characteristics. The children's understandings of synchrony were expressed in three ways. First, they reported an awareness of the simultaneous occurrence of internal or individual experiences with a variety of external events (e.g., "when it's night I eat and go to sleep . . . [and] my mom and dad watch the TV"). Second, clusters of activities synchronous with a specific part of the day or special events were described (e.g., bath sequence/morning). Third, during the last two interviews the children began describing simultaneous events in association with conventional timekeepers (e.g., "when it's Monday, we dress in white and we go and we pledge allegiance to the flag"). All of the children displayed an understanding of duration through their ability to describe separate events and use of terms indicating beginning and ending points such as "start" and "finish." During the last two interviews, some children began using conventional timekeeping language (e.g., minutes, hours) to indicate duration, however, they did not fully understand the meanings of these terms. Rhythmic patterns reported by the children ranged from astronomical movements to family routines and community practices, representing both individual processes (e.g., biological needs) and subsystems of the children's sociocultural context (e.g., family, community, and classroom systems). Examples of rhythmic patterns identified by the children are: "I go to bed when it gets dark," "I know it's three o'clock because the Rugrats come on TV," "I go to centers after recess," and "I line up for lunch when the teacher tells me."

For the children participating in this study, the pace of life before entering kindergarten

was child-centered. Individual biological and psychological needs, for the most part, organized the pace of their daily use of time. External factors affecting pace included family temporal practices such as meal times, parental work schedules, sibling school schedules, and bedtime

routines. Community practices, such as the afternoon family routine in Mexico, and the evening family routine in the United States, also influenced their pace of life.

By contrast, when the children entered kindergarten, their daily interval of time was divided into three main parts–before, during, and after school. The result was a faster pace of life intimately organized by conventional timekeepers, both at school and during certain periods of the day at home. At home, changes affecting pace included new morning and evening routines, specific mealtimes, and homework responsibilities. The morning pace before school was reported as the most problematic time of the day during the school year by all of the mothers.

Pace changes at home were occurring simultaneously and in conjunction with the children's experiences at school. The pace of the kindergarten classrooms was largely shaped by school scheduling requirements, federal and state curriculum policies, and individual teaching styles. Although all classrooms were influenced by these same factors, each had a unique pace, ranging from situations where almost every minute was outside the control of the children to classrooms where the children were encouraged to co-construct the pace.

During the summer after kindergarten, the pace for most of the children was similar to the previous summer. Other children found themselves continuing a pace similar to the school year because both parents were working or the children were attending summer camp.

Event sequencing. To detect the children's constructs concerning event sequences, two

types of questions were asked during each phase of the investigation: (a) questions requesting a description of small segments of the children's daily life (e.g., bathing and eating routines); and (b) questions asking the sequence of a typical day. In answer to questions related to small segments of the day, the majority of the children had difficulty answering "before" questions during the first interview but could answer "after" questions. By the second interview, the children began to expand their descriptions of event sequences for specific activities, and "before" and "after" constructs reflected increased accuracy in judging temporal sequences. These new understandings may, in part, be attributed to being older. However, reports of repeated daily activities at school and more structured schedules at home appeared to reinforce the acquisition of these concepts, making recognizable patterns easier to detect. For example, at school the children were being taught event sequences through direct instruction such as pattern recognition activities, art projects, seat work, or thematic curriculum activities. In the Pich classroom, for example, the group started their day with the "routine," a sequence of breathing and physical exercises (e.g., jumping jacks, hopping, forward bends) on Tuesdays through Fridays, as reported by all three children and the classroom teacher in Pich.

When asked to recount the events of a typical day, the children's responses strongly suggested that the formal school atmosphere and the more structured home environment during the school year stimulated them to divide their day into smaller parts. Before entering kindergarten, the children retold the sequence of a typical day with 4 to19 individual parts, usually one part at a time. During the second interview, which took place while the children were in kindergarten, they recounted the sequence of their day with 12 to 35 individual parts. A number of children began clustering responses in groups of 2-3 parts and two children had clusters of 6-8

parts. During the last interview, the children's responses ranged from 8-35 individual parts. Additionally, the quality of their responses changed. Each person could report more details in more descriptive language, often clustering two to eight activity parts in one response. It is interesting that all but three children had fewer parts in their daily sequence responses during the last interview than the previous interview. Table 1 presents the number of segments in the children's typical day responses for each phase of data collection.

Awareness of temporal cycles. Simultaneous to these changes, the children were developing new understandings of temporal cycles. Two categories of temporal cycles characterize the data findings, short- and long-term cyclic events. Short-term cyclic events are defined as events occurring within a day or week. At the beginning of the study, all of the children displayed an awareness of the cyclic nature of their daily life through their ability to describe the sequence of events for a typical day as stated previously. It should be emphasized that the children were asked to explain a typical day in terms of the pattern of their daily life, not simply to retell the events of that particular day. The children expressed little awareness of weekly cycles at the beginning of the study, even though the mothers gave an account of weekly family events (e.g., church-related activities). By the second interview, reports of weekly cycle structures began to emerge in the children's responses. Most of these references were shaped by school experiences such as: beginning a new "letter of the week" on Mondays, the Monday morning flag ceremony in Mexican schools, share days, specific clothes requirements (e.g., gym shoes, uniforms), and the days for specials (e.g., music, art). By the last interview, the children were integrating knowledge of weekly cycles learned at school with activities at home, such as weekend and weekday events.

Long-term cyclic events are defined as events occurring monthly, yearly, or over a

lifetime. During the first phase, there were no specific references to monthly events by the children and very few monthly activities were reported by the mothers. However, by the second interview, the children were beginning to link the names of the month being taught in school with events. For example, when one child was asked about the function of calendars, she reported that her teacher, "Tells us when month over," and then "Switches to another page." Olivia then commented that sometimes the calendar "Goes to last month." When asked what happens in the last month, Olivia responded, "Christmas." Then she added that, "The calendar goes over and over again." The most prominent yearly event discussed with the children was their birthdays, although some children were beginning to associated annual holidays with specific months. References to life cycles were associated with the children's observations of older or younger people, mostly relatives and rite of passage such as kindergarten graduation.

In sum, by integrating repetitive experiences related to school with previous temporal constructs, the children began to formulate new temporal structures. Rituals and experiences focused on the national flag in kindergartens in both the United States and Mexico provide an example of the process of temporal structural changes found in this study. National flags symbolize a sense of belonging to one's country. Federal educational policies in Mexico and school district policies in the United States often dictate observance of the flag. Before entering kindergarten, the children had no particular temporal associations with their national flag. However, the flag quickly became a time indicator for Monday mornings in Mexico. The children identified Monday as the day to wear white clothes, the first day of the school week, and the day the flag is honored by singing the national hymn and other related songs. Similarly, in some kindergartens observed in the United States, the children associated the flag with the beginning of

the school day (when they pledged allegiance to the flag). These reiterated actions constitute a first step toward recognizing both short- and long-term cyclic events by which children's individual experiences transform their previous temporal identities, linked in this case with national citizenship.

Timekeepers

Three methods for marking and measuring time emerged from the data: biological, environmental, and conventional timekeepers. Each of these methods proved to be relative to individual experiences across a variety of sociocultural contexts. Even elements of conventional timekeeping (e.g., clock time) considered "objective" by many people, acquired new meanings based on individual experiences in particular settings. For example, for the children in Pich and Campeche, the time 9:00 a.m. had no particular distinction until after they entered kindergarten, when it became associated with the beginning of the school day. Similarly, the majority of the children in Orange and Chatham counties reported specific bedtimes during the school year that passed without notice before entering kindergarten.

Biological Timekeepers

Biological timekeepers are defined as methods of marking time based on human physiology (e.g., circadian rhythms). Helfrich (1996) suggests that biological time can be examined on two levels: the micro level including recurring physiological cycles such as sleep/wake, heartbeat, and temperature cycles; and the macro level represented by, "epochal and certain irreversible biological events such as birth, sexual maturation, or death" (p. 109). Biological rhythms on both levels are entrained by environmental stimuli. For example, in this study daily biological rhythms such as waking without external interference were altered by school

scheduling requirements, and developmental milestones such as changes in chronological age were temporally marked by rituals at home and at school in all four sites.

The majority of the children's remarks about micro level biological timekeepers were related to basic needs such as waking-sleeping patterns and eating. These references were sometimes linked with other methods of timekeeping, an indication of the children's awareness of internal and external synchronous events. Responses to rhythmic biological processes were altered or delayed according to family or school scheduling practices during the school year.

For example, children became accustomed to waiting till designated meal times at school and specific wake-up times at home, despite their biological rhythmic needs.

At the same time, the children were constructing macro level biological time markers including: losing a first tooth, attending and graduating from kindergarten, and marking chronological age changes by birthday rituals. Local cultural practices reinforced completing kindergarten as a developmental milestone and rite of passage in all four sites. Photographs, graduation certificates, special end-of-the-year class books, and new clothes were proudly shared by parents and children during the last set of interviews. Similarly, rituals surrounding age changes were reinforced at home and school ranging from a special cake to parties with piñatas to Toy Story parties at McDonalds. Associations between birthdays and aging included references to death and dying. For example, when Nina was asked if she thought birthdays kept going on and on, her reply was, "Until you die. You just keep having birthdays until you die. Nope, birthdays never stop because you also have birthdays in heaven." Nina's answer may have been influenced by the ways in which her family honored her deceased grandmother. Nina's mother reported

putting up 22 Christmas trees each year, in part to commemorate her mother's birthday on Christmas Eve.

Environmental Timekeepers

In this research, timekeeping methods based on rhythmic patterns in the external environment are defined as "environmental timekeepers."Environmental timekeepers echo aspects of the particular environment in which an individual is participating. For example, in North Carolina the children reported changes in the amount of daylight and were learning to link these changes to seasonal names. In the state of Campeche, these distinctions were not as meaningful. Instead, the children were learning to associate events with the rainy and dry seasons of the tropics. Environmental timekeepers, by their very nature, are also contingent on interactions between individuals and events, people, or objects. All of the families, for instance, reported going to church as a weekly event. Televisions and radios are examples of objects used as timekeepers in addition to typical items such as clocks.

Four categories of environmental timekeepers were used by the children in this study to mark and measure time. First, natural environment timekeepers were linked to solar cycles (e.g., daylight means waking up and going to school) and observations of yearly seasonal changes, such as differences in temperature, precipitation, and the proportion of daylight and darkness. Some children also expressed an awareness of the phases of the moon (e.g., circle, banana, full moon, half moon), although they had not begun to recognize a regular rhythm to the changes they were observing.

Second, within the home environment, three methods for marking and measuring time dominated the children's responses–family routines, television programming, and parenting

practices. The trends depicted in the children's responses suggest a general increase in the number of time markers used by the children by the last phase of data collection.

Television programming rivaled conventional timekeepers as a method for marking time in the home environment. Of the nine families with televisions during the first interview, all of the children and mothers referred to watching television at certain times of the day. By the last interview, all of the families had televisions and mentioned them as a timekeeping device (e.g., a tool for marking morning activities, after finishing a meal, at night before going to bed). Some children began associating television schedules with specific times of day. The impact of television on timekeeping was dramatically illustrated by changes in Ana's family. The sun was the primary method of timekeeping in Ana's family when the study began. By the last interview, the family had acquired a television and both Ana and her mother gave numerous accounts of using the television as timekeepers, not only according to the hours of the programming, but also because the television contained a clock. Ana's mother specifically reported no longer using the sun for timekeeping purposes.

Third, reports of timekeeping originating from community events included references to bus schedules, hours of operation for local businesses, annual celebrations, and to a lesser extend the rhythmic movements and sounds of domesticated animals. Rhythmic events within the community were especially important to the children in Pich, where homes are not "hermetically" sealed and the sounds of outdoor activities flow in and out without restraint.
For example, adults and children reported the community bus schedule as a daily timekeeping device. Annual celebrations to commemorate national holidays, religious holidays, or local school festivities were reported by families in all four sites as a time marker.

Fourth, at school rhythmic environmental cues such as school rituals and routines, teacher behaviors, and group interactions emerged as elements shaping the children's new constructs. In addition to their descriptions of a typical day, the children were asked questions such as, "How do you know it's time to go to recess?" or "How do you know it's time for breakfast?" Based on these responses, five methods for marking temporal intervals at school were reported. The primary method was a specific verbal direction from the teacher. Only one child reported self-regulatory reasons or biological needs as methods for constructing daily cyclic information. Most intriguingly, this child had a teacher who made a concerted effort to help the children maintain a sense of independence and actively promoted self-regulation within the classroom.

Conventional timekeepers

Conventional timekeepers reported in the study included clocks, watches, and calendars. A shift toward conventional timekeeping penetrated every aspect of the children's temporal identity development. Both parents and teachers sent a clear message to the children that learning conventional timekeeping was essential to school participation.

Clocks and watches. The children entered the study with a variety of understandings about clocks and watches and their relationship to time, which fell into four distinct categories: (a) identifying and defining the function of clocks and watches; (b) understanding the mechanics of clocks and watches (e.g., use of large and small hands on face clocks); (c) associating numbers on clocks and watches with telling time; and (d) associating clocks and watches, and ultimately specific times, with particular events. The children were asked to identify and define the function

of at least one watch and/or clock during each phase of the study. If both items were available, the children were asked to identify and define each one separately. When the interviewer pointed to a clock or watch and asked, "What is this?" all of the children correctly identified the object during the first interview and each subsequent interview. When first asked to define the function of a clock and/or watch in response to questions such as, "Tell me what a clock (watch) does," the majority of the children provided at a minimum one logical answer. Table 2 presents the children's definitions of a clock and/or watch for all three phases of data collection.

During the study, seven children dispersed across all four sites described the hands on a face clock or watch as a method for telling time. Four children specifically referred to digital clocks separately from face clocks. In these cases, the children's conceptual understanding of what the mechanics of the timekeepers meant varied, and no one appeared to fully understand the nuances between how clocks and watches function and timekeeping. Several parents reported that their child could read digital clocks better than face clocks. Teachers varied in their incorporation of clocks and watches in the daily curriculum. Some teachers provided direct instruction on telling time using both clocks with hands and digital clocks. Other teachers in both countries felt teaching children the function of clocks and watches was not part of their charge or that the children were not developmentally ready for learning clock time.

Many initial reports of clock time were connected to waking and bedtime routines, congruent with the children's observations of the sun. Two children, Arcadia in Campeche and Phillip in Orange County, were more accurate in their conceptual understanding of telling time. In both cases, the parents had bought the children watches and were actively teaching their child to tell time either directly or indirectly at home.

Calendars. Unlike clocks and watches, many children had limited experience with calendars before entering kindergarten. Two children did not have calendars in their homes and the mother of a third child reported having a calendar, but it was not visible nor used. Therefore, these three children were not asked to identify and define the function of calendars. Of the eight remaining children, six described the function of a calendar and two were unable to do so throughout the study. The children's calendrical constructs were categorized as: (a) identifying and defining the function of calendars, (b) days of the week, and (c) months of the year.

Table 3 depicts the responses of the eight children who were asked to identify and define the function of a calendar. Many of these definitions link the function of a calendar with numbers and days. Only one child used the term "date" in a definition and no one used the term "date" during the first interview. Several children referred to the term "date" during the last two interviews during other activities, seemingly as a result of their school experiences. A daily ritual to recognize the day's date was observed and reported for each classroom, although some teachers did this more consistently than others.

Several children associated the calendar with naming the days of the week or numbers of the days. Others did not make a direct association between calendars and days of the week, but rather referred to the days of the week as independent entities. References to days of the week were expressed during the study by all of the children except Karman and Ana, the only two children who did not attend kindergarten for the entire year. A third child, who did not have a calendar in the home but referred to calendar concepts, attended kindergarten all year. Months of the year were usually expressed in reference to a specific event, such as birthdays or holidays. Only two children defined the term "month" as a conceptual part of the calendrical system.

Emotional Bonds to Time

Kindergarten is a temporal turning point filled with emotions at a time when children are still developing at a rapid pace. Socially, children are cast into a sea of unknowns where feelings of excitement, fear, confidence, insecurity, envy, pride, and many other emotions are experienced and tested as individual children and teachers begin to make comparisons, both overtly during the school day and silently within themselves. In many ways, a child's kindergarten experience sets in motion numerous lifelong psychological patterns related to schooling, including their emotional ties to time.

Researchers have pointed out that learning takes place within an emotionally charged social context that can add or detract from the learning experience (Goleman, 1995; Gracey, 1975; Slywester, 2000). Though much is to be learned about the relationship between emotions and cognitive development, most scholars agree that there are strong connections between them. For example, Slywester (2000) strongly suggests that cognitive activity is driven by emotions. He argues that it is biologically impossible to learn something without attending to it, and humans are unlikely to attend to things that are not emotionally meaningful. Goleman (1995) redefined the role of emotions in learning by suggesting that if children are taught how to use their emotions effectively, they will have a better chance to maximize the "intellectual potential" of their genetic makeup. Goleman refers to the ability to manage emotions as, "emotional intelligence, which includes self-control, zeal and persistence, and the ability to motivate oneself" (p. xii).

The mothers participating in this study felt the emotional impact of entering kindergarten was vital to their children's success in formal schooling. When mothers were asked to describe how their children's kindergarten experience was different or the same than expected, most of the

responses focused on emotional stability rather than academics. Several mothers specifically stated that they felt their child's year in kindergarten had established a positive tone for their future school life, including the mothers of two children who did not attend kindergarten all year. The participants were asked three sets of questions about their emotional bonds to time: feelings about their favorite time of day, feelings of being hurried or time passing slowly, and situations in which the children asked for more or less time.

Favorite time at home. The children were asked to report their favorite time of day in either relation to an activity they really enjoyed or a particular part of the day at home during the first and last interviews, and at school during the second interview. During the first set of interviews, soliciting responses to this question was difficult. However, by the last interview each child could articulate a favorite time of day and tell the reason they chose that particular time, with perhaps the exception of one child who repeatedly stated "all the day" as his favorite time of day. The remaining ten children associated their favorite time of day at home with distinct events, ranging from seeing the sunrise to drawing to television programs. A second comparison was made between the children's reports of their favorite time of the day at home and the mother's reports of the most relaxed time of day for the family. In the majority of cases, both the children and mothers reported positive feelings about the same portion of day. Though it is impossible to know if there is a causal relationship between these two groups of responses, some parents did suggest a relationship.

Favorite time at school. The children's responses to the same question concerning school activities were expressed as either times during the school day or favorite activities, which included an implicit reference to a time of day in most cases. The majority of the children

identified recess or outdoor play and art-related activities (e.g., drawing, playing with plasticine). Four children named center time or activities in centers (e.g., blocks, puzzles). The children's answers about their favorite activity or time of day at school make an interesting comparison to some of the teachers' responses. Only one teacher named the same time of day as her student, which was recess. This teacher felt she had more time to interact with children on the playground than during classroom activities. In North Carolina, morning group time was named as the most favorite time of day by the other three teachers because they felt the children were more eager participants then. There was a note worthy difference in the North Carolina teachers' responses and those of the two teachers in Mexico. While the North Carolina teachers reported a time segment according to their daily schedules, the responses of the teachers in Mexico were focused on favorite times related to the children's engagement in learning. Ms. Domingo, the kindergarten teacher of the three children in Campeche, describes her feelings about her favorite time of day as follows. "This I love. When I realize that they understand, that what they're seeing they're interested in, they like [it]. I feel happy. That's the moment, for me."

Times that feel hurried or slow. During the Phase III interviews, the children were asked when they felt hurried and when they felt something took a long, long time. The children reported feeling hurried during one or more of the following types of activities: personal care activities such as brushing teeth; chores such as running errands; when getting ready to go somewhere like school; when preparing to do a fun activity such as riding bikes; and when engaged in a high interest activity such as school, drawing, or watching a favorite television show. Differences in the types of responses suggest a variety of emotional connections with time. Some children linked independent routines with times they felt hurried, suggesting a conscious decision on their part

concerning time management. Many children linked hurrying with transitions to a new activity and a few responses were connected to times when the children felt fully engaged in an activity they liked.

Times that seemed to pass slowly from the perspective of the children included school work, lengthy car trips, wait time (e.g., waiting for dad to get up), and chores. The majority of these responses were affiliated to external activities in which the children little or no control. Some responses to this question reflected a child's exasperation with a particular activity, as did Ana's answer, "When I wash and wash, I can't wash any more." She added that if she had a lot of time, she could do it properly. Nina adamantly voiced her feelings in a similar fashion, "Picking up my porch, when it's got a whole bunch of toys on it. I don't like that. I have to do it until they're all gone. I do not like that!"

Activities when children request more or less time. Mothers and teachers were asked during what activities did the children request more time and which activities did they rush through. Unanimously, the mothers reported activities the children enjoyed as those in which they requested more time. Activities the children wanted to spend less time doing included: personal care activities such as bathing and eating, or activities the children considered less enjoyable such as writing letters or chores. Teachers provided responses to the more and less time questions for nine children. Overall, the teachers' reports contained less variation than the parents. Requests for more time were reported as music and movement, playing with construction materials, recess, art, and occasionally writing for two children. Two teachers reported no requests for more time. There were six reports of children spending less time on a particular type of activity and the teachers of three children reported "never." The findings suggest that children request more time

for activities they enjoy and want to spend less time on activities they do not like in the home setting. At school, the children generally comply with the schedule of activities. They appeared to request more time for activities they liked or found difficult. Requests for less time were rare and usually associated with activities they did not like.

Temporal Language

Temporal language traverses every other aspect of temporal identity. Following the logic of Vygotsky, humans are inherently social beings who largely depend on language, the crucial link between the social and psychological planes of human functioning (Wertsch, 1985). Language, therefore, takes on meaning in accordance with social interactions and can be associated with changes in psychological tools. For example, at school the children in this study were introduced to the concept, "date," using calendrical names in sequential positions (interpsychological). Eventually, some children internalized this experience (intrapsychological) and began expressing dates in relation to birthdays or particular days (interpsychological and decontextualization of mediational means).[1] Days could now be mentally categorized and stored by a method previously unknown to the children. These understandings affected the children's receptive and expressive language, in addition to their cognition of temporal order. Changes in three interrelated areas concerning the children's constructions of temporal language emerged from the data: temporal placement through language, growth in temporal vocabulary, and the development and application of homogeneous vocabulary sets.

Temporal placement through language. Modifications in the children's ability to express temporal placement through language demonstrated a growing awareness of time concepts (e.g.,

[1]The decontextualization of mediational means is the process whereby the meaning of signs become less and less dependent on the unique spatiotemporal context in which they originated (Wertsch, 1985).

past, present, future) and an ability to express these concepts through refinements in grammatical structures. For example, adverbials like "yesterday," previously used to reference any past event, became more accurately used to describe an occurrence of the previous day. By far, the children's use of present tense overshadowed their use of past or future tense during each of the three interviews. An estimate of verb tense usage, based on frequency counts of verbal statements for each child, reflects the dominate use of present tense. The approximate range for present tense usage was 18-50+, for past tense 1-13, and for future tense 0-12. All but two children fell in or near the upper half of the present tense range. The children indicated past/present/future temporal placement without changing verb tense by using adverbials (as discussed above). With rare exceptions, the past tense was used in reference to a specific incident such as something unusual or special (e.g., birthday parties or losing the first tooth) rather than routine activities. Future tense was used the least, usually in reference to planning the activity at hand. However, the children's ability to fully understand these linguistic structures remained inconsistent throughout the study.

Growth in temporal vocabulary. Shifts in temporal language were also evidenced by the growth of the children's everyday vocabulary. For example, expressions like "morning"or "church day" became more refined as they incorporated words such as "hour" or "week," and began using the calendrical names for days and months. The children's understandings of the meanings of many temporally-related terms, though emerging, remained inconsistent throughout the study. A frequency count of 16 time-related terms was conducted to examine changes in the children's temporal vocabulary. Table 4 presents each term and the total number of children using them across all three phases of the study. The first cluster of terms (general words) includes eight

words. Even though four of the eight words were not used during the first interview, all four terms were expressed by one or more children in the last two phases, including the term "week, "expressed by six children during the last phase. Additionally, the term "night" was frequently used across all three phases and the term "day" increased steadily, unlike the word "morning"which decreased in frequency. Children mainly used the word "year" in reference to age. However, the meaning of the word "year" was not always clearly understood. For example, one child remarked that his mother had visited his school "years ago" meaning sometime during his year in kindergarten.

Of the second cluster of terms (calendrical terms), the most significant change was the children's incorporation of the names of the days and months in their responses. Of special note is the emergence of the names of the days since no one mentioned them during the first interview and all but two children used one or more of them during the last interview. Though some children began using terms such as "hour" or "minute," the most significant change in the last cluster (clock terms) was an increase in the children's references to specific times. The term "minute" was used in phrases to mean wait time. It is important to note that at least twice as many of the children's responses indicated an understanding of these and other time-related terms through receptive language interactions.

Development and application of homogeneous vocabulary sets. Existing vocabulary sets were altered after the children entered school to incorporate school-related terms (e.g., "mornings" became "mornings before school") and a new set of homogeneous vocabulary linked to the classroom setting was constructed (e.g., center time, group time). From these separate vocabulary sets, the seeds of a unified group of terms began to take shape including: lifeway terms

(e.g., meal times, rites and rituals, general terms for cycle segments); institutional-related terms (e.g., opening/closing times, schedule references, group versus individual times); and conventional timekeeping terms (e.g., time objects, clock times, calendrical terms).

Nonrhythmic Cues

Understanding nonrhythmic cues that influence temporal identity development is a complex business. From the sociogenetic perspective, viable nonrhythmic cues are factors within a known sociocultural context that are meaningful to individuals. Three aspects of the process of using nonrhythmic cues to construct temporal meaning are important to consider. First, individuals temporally bracket cause-effect relationships according to their personal knowledge base and the elements stimulating an experience (Bullock, Gelman, & Baillargeon, 1982). In other words, nonrhythmic cues and temporal constructs must be bracketed together by individuals to give temporal meaning to an experience. Second, because individual cognitive development is ongoing, nonrhythmic cues may have greater or less influence on temporal constructs at different times. However, their effect is not segmented but continuous. Third, time plays a unique role within and across systems. Bronfenbrenner and Morris (1998) describe the relationship between time and systems as follows:

> [Time] has a prominent place at three successive levels–micro-, meso-, and macro-. *Microtime* refers to continuity versus discontinuity within ongoing episodes of proximal process. *Mesotime* is the periodicity of these episodes across broader time intervals, such as days and weeks. Finally, *Macrotime* focuses on the changing expectations and events in the larger society, both within and across generations, as they affect and are affected by, processes and outcomes of human development over the life course (p. 995).

Nonrhythmic cues at home. Though families share many attributes of time, each family has a culture of time expressed according to their own agendas, interpretations of cultural practices,

and family histories (Stack & Burton, 1993). These practices affect temporal identity development. In this study, three types of nonrhythmic cues in the home settings were especially important. First, interpersonal family experiences affected how time was used and emphasized (e.g., belief and value systems). For example, in one family, the children were taught they should keep busy and search out meaningful ways to spend their time. This child appeared to apply these values at school as reported by her teacher, "If she should finish an activity, she will either talk with a friend or find something else to do quietly. She's an independent learner and she can find something else to do." Other children were taught to respect elders, to wait for all family members to gather before starting a meal, and to manage time according to upcoming tasks.

Second, modifications in family functioning affected the family culture of time such as changes in the amount and type of time spent with the children, the designated primary caregiver, the children's after school and summer care arrangements, and the amount of time for family leisure activities. In particular, moves to other homes and parental employment changes disrupted the family culture of time and stimulated changes in previously held temporal constructs.

Third, aspects of the physical environment influenced temporal understandings. For instance, families living in houses with numerous rooms could assume a more individualistic approach to time, a temporal disassociation between individuals. Also, many homes displayed photographs of the children and other family members, including baby pictures and family members across different generations as visual timekeepers. In homes with numerous clocks and calendars, the parents usually emphasized keeping track of time. In the homes with one or two clocks, the mothers reported using them for specific times of day or particular events, but not consistently throughout the day. In homes without these items, mothers mostly used biological

and environmental cues to track time. Technology was an especially important time factor for families. Generally mothers reported an accelerated pace of life in relation to technology.

Nonrhythmic classroom cues. Beliefs and values practiced by the teachers influenced the way time was handled in the classrooms, and served as a role model for placing emphasis on specific aspects of time. For example, some teachers tried to give children the time they needed to explore options, while others adhered to scheduling constraints. Most teachers said they adjusted their expectations according to the developmental level of individual children. The physical environment also affected opportunities for learning about time. Some classrooms, for example, contained toys, books, and other materials that promoted conventional timekeeping and others had very few materials related to time. The classrooms in North Carolina had large wall clocks prominently displayed, whereas the classrooms in the state of Campeche did not. All of the classrooms had distinct arrangements of the furnishings and materials that supported a recognizable daily routine, and each child was able to make associations between areas of the room or school and specific activities during their typical day reports.

There were significant differences in the availability of technology. Some classrooms had computers, televisions, and other equipment. In other classrooms, there were no technological supports. In Pich, there were no telephones, no copying machines, no computers, no televisions, or any other types of technological equipment. If the teacher wanted to do an activity that involved duplicated images on paper, she had to copy each part by hand. By contrast, the Orange and Chatham County classrooms had their own telephones, computers, and televisions. Items such as copying machines were located in a central area for everyone to use. Like the parents, the teachers reported a faster pace of life as a result of technological advances.

Nonrhythmic cues related to local and state educational policies. Several areas of nonrhythmic cues related to time and schooling were identified by the administrators including: school-year scheduling policies, age entrance policies, the impact of national and state curriculum and assessment policies on time, and teacher training issues related to new program policies and time. National, state, and local policies related to time were reported as powerful elements as to how classrooms were run, when children were allowed to enter school, and school scheduling requirements. In the United States, the pressure of teaching state standards in preparation for accountability testing in third grade appeared to stimulate more structure learning opportunities and constrain time for creative exploration. In Mexico, the administrators expressed positive feelings about policies changes that stimulated local control and a more child-centered approach to early childhood education.

Significance

The findings of this research demonstrate that young children's temporal constructions can be delineated and understood developmentally and holistically as their temporal identity. Table 5 presents examples of indicators of temporal identity development in the temporal structure conceptual area that were identified during this research. Even though the children who participated in this study were purposefully selected from different sociocultural contexts, the majority of children exhibited these temporal constructs. However, there were differences in the processes the children used to acquire these new understandings and the values placed on different aspects of time depending on the characteristics of their various sociocultural systems (e.g., microsystem, mesosystem). Once the children entered kindergarten, they exhibited a shift toward learning conventional timekeeping methods. This change was reinforced in all of the home

environments, some more than others.

Results of this study indicate that formal schooling should take into account the informal knowledge that children develop in home, community, and sociocultural systems regarding the construction of time concepts. Environmental cues and activities not ordinarily considered timekeepers proved to be more temporally significant than anticipated across the case studies and formal school instruction was often out of sync with home and community practices. In the formulation of educational policies and practices, it cannot be assumed that conventional temporal indicators are the sole substance of what constitutes children's temporal identities. We suggest consideration of the following issues surrounding temporal identity development and early childhood education.

- What is relationship between developmental milestones and temporal identity development?
- How do parents and other family members teach young children about time? Which parental methods are the most effective in particular communities or cultures?
- How can temporal beliefs and values of local families and communities be integrated into curriculum and instructional practices and school policies?
- What assumptions about time are being taught to children? Research examining the politics of school culture related to time could shed light on how daily, weekly, and yearly rituals of prominent people and national events are indoctrinating children's values.

- Are there "critical periods" of temporal identity formation during the first five years of life? If so, what are the most formative times? How can educators support these critical shifts?
- What temporal adjustments do young children and families experience when they move to the

United States from Mexico and other countries? How do they affect participation in public schooling?

- Further investigation of the circadian rhythms of young children could provide information on possible relationships between learning and times of day. Policy makers could use this information to make informed decisions about school and classroom scheduling.
- What are the effects of temporal practices at school for children with disabilities?
- From a global perspective, how will computer technology and other satellite communications influence references to temporal identity development and how will these changes affect education?

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Table 1

Summary of the Number of Parts of the Children's Typical Day Responses for Each Phase

Child	Phase I	Phase II	Phase III
Adam	8	29	21
Arcadia	8	20	15
Ana	17	28	17
Donato	7	14	14
Elisa	17	44	29
Juan	10	16	13
Karman	12	22	8
Keisha	11	16	32
Nina	13	27	19
Olivia	17	35	35
Phillip	15	28	14

Note. *Phase I was June-August, 1999; Phase II was January 31-February 2000; and Phase III was June to August, 2000.

Table 2

Children's Definitions of Clocks and Watches for Each Phase

Child	Phase I	Phase I	Phase III
Adam	When the morning comes, you wake up. Then the night comes and you go to sleep (clock). You go to sleep with it and wake up (watch).	It helps you read your time.	How much time it is . . . when you're out of home (watch). Same as watch, only it's bigger (clock).
Arcadia	To see the hour.	It goes putting the hours . . . when you see it in a film, in the video it says that it will finish in two minutes.	To see the hours . . . 2 o'clock because small hand is on the two.
Ana	See what time it is.	NA*	Negotiating the letters (meaning numbers)
Donato	Tells the time.	NA*	It gives the time.
Elisa	The hour, they tell time.	It's one o'clock . . . to see the hours.	It gives the hour.
Juan	To see the time (clock). To see the time too (watch).	NA*	To tell what time it is.
Karman	When the bell ring, it's that to school goes my mom	To give you the time.	It's five o'clock . . . because four o'clock is finishing (clock). To see what time it is (watch).
Keisha	See what time it is (watch). Put them on the wall, I don't know (clock).	It tells you the time, what time it is.	[Tells] numbers . . . Eight o'clock (watch). I don't know . . . 6, um, 37 (clock).
Nina	Tells the time.	The time . . . it's about 12 (watch). The time (clock).	It tells what time it is (watch). What time it is, like five o'clock or 10 o'clock, or something like that (clock).
Olivia	Tells us the time (watch). The time . . . It tells us what time my mom comes or her get off from work or Marcia (clock).	What time it is (watch and clock).	[Tells] time (watch). Time and tell you what time it's not supposed to be . . . like it's 11:30 or 11 o'clock (clock).

Phillip	To say what time it is (watch). It does the same thing as a watch. . . it tells time (clock).	A hand, a watch, a clock . . . tells you time (clock). A watch tells time (watch).	[Tells] time (clock and watch).

Note. *NA means not observed.

Table 3

Children's Responses to Defining the Function of Calendars*

Child	Phase I	Phase II	Phase III
Adam	(Acknowledged but no answer.)	I don't know.	I don't know. I forgot.
Arcadia	To see what numbers we are.	It tells you the days. The days of, the numbers, the days like 1-2-3-4-5-6-7-8-9-10-11-12-13-14 15-16.	For the weeks, to see the days, to see the 2000.
Elisa	NA**	To know what it is . . . to know if it's Monday or Tuesday . . . The numbers are to read–1,2,3,4,5,6.	NA**
Juan	To look at.	NA**	I don't know.
Keisha	I don't know.	It tells you what date it is.	We put numbers on it . . . [they tell us] the day of the week . . . the number of the week. It tells us the number of the day.
Nina	NA**	It tells when things are happening.	What's happening today.
Olivia	Calendars tell us what day this is.	What month it is . . . calendar goes over and over again.	What day it is and what month it is.
Phillip	To see the days when you forget what the days are.	It tells you if it's January the 1st or March the 16th. Today is . . . and tomorrow is going to be March the 17th. All calendars do the same thing.	[Tells] our numbers

Note. * Ana, Donato, and Karman were not asked to identify the function of a calendar because there were no examples available in their homes.
** NA means not observed.

Table 4

Comparison of Number of Children Using Temporal Terms Across Phases

Temporal terms	Phase I	Phase II	Phase III
General Words			
Night	9	10	11
Morning	8	5	3
Day	3	6	10
Year	2	2	6
Afternoon	0	2	5
Month	0	2	1
Date	0	2	2
Week	0	1	6
Calendrical Terms			
Calendar	3	4	4
Months (name)	3	5	7
Specific date	2	2	3
Days (name)	0	6	9
Clock Terms			
Clock/watch*	8	8	10
Specific time	5	5	9
Hour	3	2	4
Minute	2	1	5

Note. *Because the word "reloj" means both clock and watch in Spanish, both words were counted for this category.

Table 5

Examples of Temporal Identity Development Indicators for Temporal Structure Constructs Based on Case Studies

	Less complex constructs More complex constructs **Examples of Temporal Identity Development Indicators Based on Case Study Results**		
Temporal structures	Associates simultaneous internal and external events (e.g., falls asleep listening to the television)	Synchronizes clusters of events with portion of day (e.g., before school activities)	Begins to understand synchrony between conventional intervals and particular events (e.g., bedtime is 8:30)
	Describes events as intervals with beginning and end points (e.g., sun rises in morning and sets before dark)	Indicates duration by identifying beginning/end, before/after, start/finish concepts	Begins using conventional time to specify duration of events (e.g., 5 minutes)
	Uses rhythmic patterns in home setting to mark time (e.g., take bath after midday meal)	Identifies and develops new rhythmic patterns to mark time at school (e.g., wash hands after recess)	Begins to associate familiar rhythmic patterns with conventional timekeeping (e.g., go home at 2:30)
	Understands difference between fast and slow pace	Identifies pace changes to meet school requirements (e.g., gets up with alarm clock)	Identifies differences in pace according to situation (e.g. faster pace before school, slower on weekend)
	Describes sequence of familiar events (e.g., get up, eat breakfast, brush teeth, get dressed)	Retells sequence of typical daily cycle from waking to going to bed, including events outside home	Identifies daily cycle using conventional timekeeping terms (e.g., wake at 8:00, eat at 12:00, bed at 9:00)
	Beings to distinguish between daily cycles and larger time intervals related to week, month, or year	Begins to understand weekly and yearly cycles (e.g., weekend vs. school days, summer vs. school year)	Identifies weekly and yearly cycles using conventional timekeeper terms (e.g., church on Sundays, birthday, summer vacation versus school year)